

Embedded Intel® Architecture Reference Design for Communications Appliances



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Contents

Executive Summary	3
Intel® Communications Reference Design	4
Securing the Internet Gateway	4
A ‘Black Box’ with Many Uses	4
Flexible Support for LANs with "No New Wires"	5
Benefits for Developers	5
Intel® Internet Exchange Architecture	6
Conclusion: A Versatile Platform for Communications Appliances	6
For More Information	6

Executive Summary

The promise of faster Internet downloads and “always-on” connectivity has motivated many users of small office and home office PC networks to replace dial-up connections with broadband services such as Digital Subscriber Line (DSL) and cable modem services. While a broadband connection obviously improves the overall Internet experience, it can also raise significant security issues. Continuously connected computers with static IP addresses are more vulnerable to hackers than computers that connect to the Internet with intermittent dial-up services. Confidential files and sensitive information can be stolen or deleted. PC software applications and operating systems can be damaged or made unusable. Hackers can steal passwords and other information stored in a PC to make illegal financial transactions or use an unprotected PC to cover their tracks while attacking another system.

Fortunately for small office and home broadband users, a communications appliance can function as a gateway between the local network and the Internet to provide advanced firewall functionality. Connected between the local network and the broadband modem, the appliance provides protection from outside hackers and also provides users with the capability of selectively filtering access to Internet sites. For a home or small office, this is typically a far less expensive solution than implementing firewall and filtering applications on a dedicated gateway server.

The Intel® Entry-level Communications Reference Design can help accelerate the development of communications appliances and multifunction Internet access devices. The use of a scalable Intel® Architecture platform supports easily customizable, software-based security solutions in addition to a wide variety of additional value-added network services. These services can include virtual private networks (VPNs), local network e-mail management, virus detection, and file server functionality. Intel Architecture simplifies software programming and also enables hardware vendors to make use of the large existing body of development tools and software. For hardware vendors and software developers, the Intel platform provides a scalable fast time-to-market solution for the small business and home market segments that supports flexible software-based product differentiation, while helping to extend product lifecycles with support for continuous upgrades.

New developments in small office and home networking also encompass several “no new wires” technology initiatives that are expected to co-exist in the home and small office segment. These technologies include home phone line networking (HomePNA), the BLUETOOTH* short-range wireless connectivity specification, HomeRF wireless networking, and 802.11b wireless Ethernet. Intel communications platforms flexibly support all of these networking protocols.

Intel® Communications Reference Design

Intel has developed an entry-level communications reference configuration in a small (5.12" x 8.5") form-factor. The platform includes Intel hardware building blocks that support the increasing performance requirements of small office and home networking. Components include the Intel® Celeron™ 300A processor in Socket 370 package and the Intel® 440BX chipset. These components provide the processing and system-level performance headroom to meet the demands of present and future software applications. The 440BX chipset supports a scalable design that permits the use of higher-speed processors.

In addition to the processor and chipset, the platform includes two Intel Ethernet controllers and Intel Advanced Boot Block flash memory for non-volatile storage of BIOS and system firmware. Super I/O support includes a parallel port, a conventional serial port, two Universal Serial Bus (USB) ports, and one IDE port for mass storage devices. Other platform features include support for SDRAM and a slot for a PCI mezzanine card (PMC). While all of these storage, I/O and system expansion capabilities may not be used, they provide hardware developers with a multitude of configuration options. The result is a comprehensive Intel communications platform solution with the processing

power and connectivity to support multiple entry-level communications appliance applications. Intel is now making its proof-of-concept platform available to board manufacturers and independent hardware vendors who are free to modify the design to accommodate their specific application requirements.

Securing the Internet Gateway

When multiple PCs are networked in a small office or home, it is most economical for the local network to access the public Internet through a single shared connection. Intel's entry-level communications platform simplifies the development of Internet gateway appliances that are designed to reside between the local area network and the Internet connection. The appliance controls information flowing into the local network from the Internet in addition to data moving from inside the network to the Internet. The gateway can be configured to provide the same kinds of security protection employed in enterprise computing environments. For example, with the appropriate software, the gateway appliance can be used to support a firewall with customizable functionality. It can be programmed to prevent unauthorized users from gaining access to networked PCs or to block PC users on the network from accessing certain URLs at the discretion of the small business manager or the home user.

The traditional small office Internet security solution involves the use of a dedicated server to host firewall software. This solution can also require the services of a technician to load and configure the software and make the necessary connections. The user, whether in a small company or a home office, can wind up paying for platform capabilities on the server that are not needed, such as graphics and a sound card.

A more cost-effective alternative is to install a dedicated gateway communications appliance, based on a platform designed to cost-effectively support security and networking applications in small office and home environments. Intel's communications reference configurations meet these requirements.

A 'Black Box' with Many Uses

At the end-user site, a device based on Intel's entry-level communications platform would resemble a "black box" with Ethernet in and out ports, an external power supply and a set of LEDs. The appliance resides between the existing local network and the Internet. Serving as an Internet gateway, it handles packet filtering and standard firewall proxy server functions. It further enables small office and home users to benefit from sophisticated capabilities including multiple levels of security and VPN functionality that can enable the creation of an encrypted "tunnel" connection between a user's home and business via the Internet.

In addition, the appliance can be customized to support multiple functions, ranging from virus detection to flexible e-mail services, for the local network. The appliance can also provide scalable network attached storage. The important point is that Intel's communications appliance design provides all of this functionality without requiring users to purchase a dedicated gateway server, and home or small business users will not be required to open the appliance to install and configure network cards.

Flexible Support for LANs with "No New Wires"

In homes and small offices with multiple computers, a local area network (LAN) enables users to affordably share a single high-speed Internet connection or other resources, such as file servers and printers. Until recently, adding a LAN has required drilling holes in walls and pulling wire. Small and home office users can now take advantage of several alternatives that do not require new wires.

Intel expects these alternatives to co-exist and enable a new level of flexibility and ease of use in small office and home environments. Intel's communications reference designs support all of these technologies, which can be implemented directly on the main board of the appliance, or on a PCI Mezzanine Card plugged into the PMC connector. The PMC approach enables an appliance to support any of these networking technologies by changing the daughter card.

The home and small office networking alternatives include:

- Home Phoneline Networking (HomePNA) – an industry group working to ensure adoption of a single, unified phoneline networking standard and bring to market a range of interoperable home networking solutions.
- Home RF – an industry group working to establish an open industry specification for unlicensed radio-frequency digital communications for PCs and consumer devices anywhere, in and around the home.
- The BLUETOOTH* Group an industry consortium working to develop specifications for low-cost, short range radio links between mobile PCs, mobile phones and other portable devices.
- Wireless Ethernet (802.11b), a wireless networking specification originally developed for local area networking in business offices and campus environments.

Benefits for Developers

Intel's entry-level communications reference design has significant advantages for developers:

- It provides a comprehensive platform solution that can dramatically accelerate time-to-market. Schematics are available for download at no cost from Intel's Developer Site at: developer.intel.com/platforms/applied/comm/entry.htm
- The platform is based on the open Intel Architecture that is familiar to most programmers. Moreover, the architecture supports multiple operating systems, including Linux. Scalable Intel Architecture enables developers to differentiate their products with value-added features and functionality, while maintaining the levels of performance that end-users expect.
- Intel's flexible platform solution supports integrated functionality. For example, a hardware vendor could provide an integrated solution that combines DSL modem functionality with advanced firewall security and Internet sharing in a simple appliance designed for home and small office users.
- Intel Architecture encompasses a large variety of development tools and software, including the components, tools and software available for PC developers. Board-level solutions are supported by a variety of third-party vendors.
- The Intel roadmap leads to higher levels of performance. Intel processors and other components are designed to meet the extended lifecycle requirements of communications applications.
- Intel manufacturing capacity and quality helps ensure product reliability and customer satisfaction.

Intel® Internet Exchange Architecture

The Intel® Internet Exchange architecture (IXA), as shown in Figure 1, provides a consistent framework for OEMs and independent software vendors to quickly deploy new networking and communications services and develop differentiated networking products that deliver scalable performance with reduced total cost of ownership. Intel IXA includes end-to-end development solutions and building blocks that enable developers to create solutions for the entire Open Systems Interconnectivity (OSI) stack.

Embedded Intel Architecture delivers solutions that meet the performance requirements of the Application Services Layer of the OSI Model. By incorporating scalable embedded Intel Architecture components and software within Intel IXA, Intel is delivering a flexible top-to-bottom architecture that delivers high performance, scalability, code compatibility and programmability that enables faster and more cost effective software-based product differentiation.

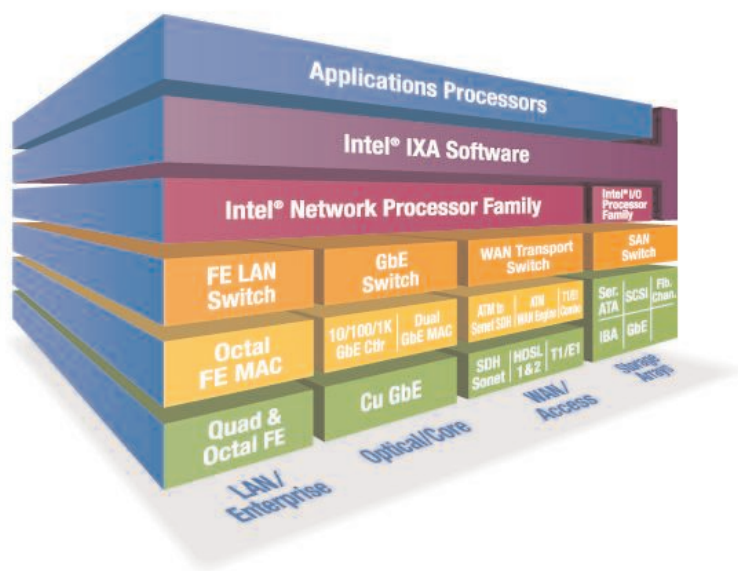


Figure 1 Intel® Internet Exchange Architecture

Conclusion: A Versatile Platform for Appliances

Intel's reference configuration for communications provides a versatile platform for the development of communications appliances that make advanced functionality available to small office and home users. Programmable appliances based on Intel's reference configuration can also support a wide variety of other functions, ranging from virtual private networks to virus detection and e-mail management for the local network.

The Intel entry-level communications reference platform combines easy programmability with flexibility and performance headroom in a configuration designed to support fast time-to-market development by hardware and software vendors.

For More Information

For more information on Intel's reference configuration for communications, including block diagrams and downloadable schematics, visit Intel's Developer Site at: developer.intel.com/platforms/applied/comm

For more information on Intel Internet Exchange Architecture Solutions, visit: www.intel.com/ixa

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